

Teaching Experience and Interests

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My teaching experience began when I was an undergraduate student at Hope College, where I was a teaching assistant for many of the physics department lab courses. Hope College is an undergraduate-only institution, so many of the roles traditionally reserved for graduate students fell to undergraduates. As a result, I gained valuable experience in both research and teaching. I continued my involvement in teaching at the University of Notre Dame where I was a TA for the pre-med and engineering physics classes. This involved supervising lab courses, lecturing for review sessions, individual tutoring, and homework and test grading. Because of my experience, I believe that learning by doing is the best way to truly understand a subject. Lab work and homework are essential elements of a good classroom education. In the same way that research experience makes a subject more concrete, it is impossible to learn physics without working through homework problems on a regular basis.

Recently, my involvement in teaching has been geared primarily toward bringing students into the research environment. I believe that this is an essential part of their education and development as physicists. I experienced this personally beginning with my undergraduate research work. The fantastic experience that I had doing research at Hope College directly led to my continued career in physics. I want to offer the same kind of rewarding hands-on research opportunity to students. Fortunately, I had the opportunity to do this for both undergraduate and graduate students during my postdoc with Columbia University.

I have worked with Columbia University graduate students to take meson production data at the Hadron Production Experiment (HARP) at CERN. We have also worked extensively to measure the inclusive charged pion cross sections for beryllium and aluminum targets using the HARP detector. This analysis is very important to the MiniBooNE experiment, and our graduate students have had the opportunity to contribute significantly to it. I have also been able to involve REU (Research Experience for Undergraduates) students in challenging accelerator physics projects at the Fermilab Booster synchrotron. Through these programs, undergraduate students have fantastic opportunities to join the world of international physics research at many different experiments. While working with these students, I have learned that it is very important to find projects for them with an appropriate scope. This is especially true for undergraduates, since they are often constrained by a shorter time scale. They must be able to work on a task where they can feel involved, definitively contribute, and learn useful skills. Given the right opportunity, a student can truly become involved in challenging high energy particle and accelerator physics research.

In addition to working with university students, I have also done outreach and education for individuals with a large range of skills and knowledge. This group included high school teachers, high school students, grade school students, friends, and local Illinois residents. I have worked with high school teachers doing research at Fermilab, and have been the subject of a living scientist biography for high school students. I have developed interactive physics demonstrations geared toward grade school children and have taken the program to several local second grade classes. For the Girls' Science Salon at Fermilab, I adapted the demonstration program to fit junior high school girls. I have also led the "Ask A Scientist" portion of the Girl Scout Fermilab Workshop which introduced hundreds of local girl scouts to the science and nature at the lab. Through these kinds of experiences, I have learned how to match my explanations and discussions to the level of the listeners in order to maintain their interest and keep them engaged in learning. I believe it is important to connect with people outside of academia, particularly girls and young women, and share the fascinating and exciting world of physics with them. I am eager to continue my outreach to K-12 students and the general public as well as my work with university students.